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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Alastair Dent

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EXAMINER

PILKINGTON, JAMES

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/526,258	Applicant(s) DENT, ALASTAIR	
	Examiner JAMES PILKINGTON	Art Unit 3656	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 March 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/4/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the first input encoder, first output encoder, second input encoder, second output encoder, third input encoder and third output encoder must be shown or the feature(s) canceled from the claim(s). Currently the drawings only show a single encoder which is not defined as an input or an output as reference character 38. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 1, 22 and 23 are objected to because of the following informalities:
- Claims 1, 22 and 23 contain reference character for a portion of the elements claimed, for consistency purposes the reference characters should be removed or the missing characters inserted.
 - Claim 1, the crank shaft is referenced as 34 in the claim however in the specification it is referenced as 36 and the bearing is 34.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 12-14 and 19-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 12-14 and 19-21 require a second input encoder, a second output encoder, a third input encoder and a third output encoder. The specification does not have support for these encoders. Where are these encoders located?

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5. Claims 4, 7, 11, 14 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "high" in claims 4 and 11 is a relative term which renders the claim indefinite. The term "high" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. What is considered to be a "high lead angle"?

Claim 7 recites the limitation "first input position encoder" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 14 recites the limitation "second input position encoder" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 21 recites the limitation "third input encoder" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 2, 4, 8, 9, 11, 15-17 and 22, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, WO 02/060653, in view of Akin, USP 4,565,104.

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Harris discloses a back-drivable robot head comprising:

- a manually-graspable driving member (16);
- a force sensor (18) for sensing forces applied to the driving member (16) by a user;
- an arm (12) for carrying a tool (14) the position of which is to be controlled;
- a first rotation control mechanism (28) for rotating the arm about a first axis (A2) in response to the sensed forces,
- the first rotation control mechanism (28) comprising a first rotational motor (30)
- in which the first motor (30) is mounted for pivotal motion with respect to a frame of the head
- a second rotation control mechanism (20) for rotating the arm about a second axis (A1), the said mechanism comprising a second rotational motor (2)
- the first axis (A2) is perpendicular to the second axis (A1)
- the arm (12) is extendible along a third axis (A3)
- in which the first (A2), second (A1) and third axes (A3) intersect at a point

Harris does not disclose that the rotation control mechanisms comprising a lead screw and a bearing which moves longitudinally of the lead screw as it rotates, the bearing being pivotally coupled to an offset crank of or secured to the arm, the lead screws mounted for pivotal motion with respect to a frame of the head, wherein the lead screw has a high lead angle.

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Akin teaches rotation control mechanisms comprising a motor (29), a lead screw (24) and a bearing (37) which moves longitudinally of the lead screw (24) as it rotates, the bearing being pivotally coupled to an offset crank (32) of or secured to an arm (34/35), the lead screw has a high lead angle for the purpose of providing a linear actuator to rotate a load that minimizes loss of moment arm at the extremes of rotational travel of the load.

It would have been obvious to one having ordinary skill in the art to modify Harris and provide a first and second rotation control mechanism that comprises a lead screw and a bearing which moves longitudinally of the lead screw as it rotates, the bearing being pivotally coupled to an offset crank of or secured to the arm, the lead screw has a high lead angle, resulting in the lead screw being mounted for pivotal motion with respect to a frame of the head, as taught by Akin, for the purpose of providing a linear actuator to rotate a load that minimizes loss of moment arm at the extremes of rotational travel of the load. In additional substituting one transmission mechanism for another would have been obvious to one having ordinary skill in the art.

8. Claims 3 and 10, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, WO 02/060653, in view of Akin, USP 4,565,104 and further in view of Yamanaka, USP 4,825,714.

Harris in view of Akin discloses all of the claimed subject matter discussed above.

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Harris in view of Akin does not disclose that the motor is directly secured to the lead screw, without any intervening gears.

Yamanaka teaches a lead screw drive arrangement wherein the motor (11) is directly secured to the lead screw (15), without any intervening gears.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the motor spindle arrangement of Harris in view of Akin with the direct drive system of Yamanaka, for the predictable result of removing play/backlash that is found between intervening gears.

9. Claims 5-7, 12-14 and 23, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, WO 02/060653, in view of Akin, USP 4,565,104 and further in view of Zufle, US PGPub 2003/0109953.

Re clms 5-7 and 12-14, Harris in view of Akin discloses all of the subject matter as discussed above.

Harris in view of Akin does not disclose a first sensor for measuring the position of the arm and a second sensor for measuring the rotation of the motor and sounding an alarm if there is an inconsistency.

Zufle teaches a detection system which uses a first sensor for measuring the position of an arm/movement member (detector 5) and a second sensor for measuring the rotation of the motor (paragraph 0025) and sounding an alarm if there is an inconsistency (sets down drive 3 or paragraph 0017) for the purpose of providing a

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direct and indirect detection method to ensure movement of the arm is correct (paragraph 0015 and 0025).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Harris in view of Akin and provide a first sensor for measuring the position of the arm and a second sensor for measuring the rotation of the motor and sounding an alarm if there is an inconsistency, as taught by Zufle, for the purpose of providing a direct and indirect detection method to ensure movement of the arm is correct.

Re clm 23, Harris discloses a back-drivable robot head comprising:

- a manually-graspable driving member (16);
- a force sensor (18) for sensing forces applied to the driving member (16) by a user;
- an arm (12) for carrying a tool (14) the position of which is to be controlled;
- a first rotation control mechanism (28) for rotating the arm about a first axis (A2) in response to the sensed forces,
- the first rotation control mechanism (28) comprising a first rotational motor (30)

Harris does not disclose that the rotation control mechanisms comprising a lead screw and a bearing which moves longitudinally of the lead screw as it rotates.

Akin teaches rotation control mechanisms comprising a motor (29), a lead screw (24) and a bearing (37) which moves longitudinally of the lead screw (24) as it rotates

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for the purpose of providing a linear actuator to rotate a load that minimizes loss of moment arm at the extremes of rotational travel of the load.

It would have been obvious to one having ordinary skill in the art to modify Harris and provide a first and second rotation control mechanism that comprises a lead screw and a bearing which moves longitudinally of the lead screw as it rotates, as taught by Akin, for the purpose of providing a linear actuator to rotate a load that minimizes loss of moment arm at the extremes of rotational travel of the load. In additional substituting one transmission mechanism for another would have been obvious to one having ordinary skill in the art.

Harris in view of Akin does not disclose a first sensor for measuring the position of the arm and a second sensor for measuring the rotation of the motor and sounding an alarm if there is an inconsistency.

Zufle teaches a detection system which uses a first sensor for measuring the position of an arm/movement member (detector 5) and a second sensor for measuring the rotation of the motor (paragraph 0025) and sounding an alarm if there is an inconsistency (sets down drive 3 or paragraph 0017) for the purpose of providing a direct and indirect detection method to ensure movement of the arm is correct (paragraph 0015 and 0025).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Harris in view of Akin and provide a first sensor for measuring the position of the arm and a second sensor for measuring the rotation of the

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motor and sounding an alarm if there is an inconsistency, as taught by Zufle, for the purpose of providing a direct and indirect detection method to ensure movement of the arm is correct.

10. Claim 18, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, WO 02/060653, in view of Akin, USP 4,565,104 and further in view of Zimmerman, USP 6,494,005.

Harris in view of Akin discloses all of the subject matter as discussed above.

Harris in view of Akin does not disclose that the arm is extendible on a third lead screw which is rotated by a third rotational motor.

Zimmerman teaches an arm (12) extendable on a lead screw (50) which is rotated by a motor (30) for the purpose of concealing the motor within an arm segment (C1/L45-52) which in turn reduces the size of the device.

It would have been obvious to one having ordinary skill in the art to replace the rack and pinion drive system of Harris in view of Akin with a third lead screw which is rotated by a third rotational motor, as taught by Zimmerman, for the purpose of concealing the motor within an arm segment which in turn reduces the size of the device.

11. Claims 19-21, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, WO 02/060653, in view of Akin, USP 4,565,104 and Zimmerman, USP 6,494,005, and further in view of Zufle, US PGPub 2003/0109953.

Harris in view of Akin and Zimmerman discloses all of the subject mater as discussed above.

Harris in view of Akin and Zimmerman does not disclose a first sensor for measuring the position of the arm and a second sensor for measuring the rotation of the motor and sounding an alarm if there is an inconsistency.

Zufle teaches a detection system which uses a first sensor for measuring the position of an arm/movement member (detector 5) and a second sensor for measuring the rotation of the motor (paragraph 0025) and sounding an alarm if there is an inconsistency (sets down drive 3 or paragraph 0017) for the purpose of providing a direct and indirect detection method to ensure movement of the arm is correct (paragraph 0015 and 0025).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Harris in view of Akin and Zimmerman and provide a first sensor for measuring the position of the arm and a second sensor for measuring the rotation of the motor and sounding an alarm if there is an inconsistency, as taught by Zufle, for the purpose of providing a direct and indirect detection method to ensure movement of the arm is correct.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES PILKINGTON whose telephone number is (571)272-5052. The examiner can normally be reached on Monday - Friday 7-3.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on (571)272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. P./
Examiner, Art Unit 3656
10/15/08

/Richard WL Ridley/
Supervisory Patent Examiner, Art Unit 3656